Medical Staff Conference

The Clinical Challenges of Myocardial Infarction in the Elderly

Discussant
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These discussions are selected from the weekly staff conferences in the Department of Medicine, University of California, San Francisco. Taken from transcriptions, they are prepared by Homer A. Boushey, MD, Professor of Medicine, under the direction of Lloyd H. Smith, Jr, MD, Professor of Medicine and Associate Dean in the School of Medicine. Requests for reprints should be sent to the Department of Medicine, University of California, San Francisco, School of Medicine, San Francisco, CA 94143.

RICHARD K. ROOT, MD*: *However they are defined, the elderly are clearly becoming an increasingly important group in the population physicians care for. In this conference Harlan Krumholz, MD, reviews the particular challenge of the diagnosis and treatment of only one of the many diseases more common in the elderly, myocardial infarction. His remarks are important not only for their relevance to this important disease but also for their definition and illustration of the issues involved in treating elderly patients with any serious condition. Dr Krumholz has served with distinction as the Medical Chief Resident at the University of California, San Francisco (UCSF), and will next year pursue further his interest in myocardial infarction as a fellow in cardiology at Harvard Medical School and Beth Israel Hospital in Boston.*

HARLAN M. KRUMHOLZ, MD†: Physicians are caring for a rapidly growing segment of the population, the elderly, with little clinical information. Heart disease, the leading health problem in the elderly, is the most blatant example of this problem. The bulk of the understanding of ischemic heart disease is gleaned from studies that focused primarily on middle-aged populations. Meanwhile, the practice of medicine is increasingly directed toward an older group.

In this review I explore what is known about the elderly and myocardial infarction. The review is organized around five interrogatives: who, why, how, what, and when. I discuss who the elderly are, why heart disease and myocardial infarction in the elderly deserve our attention, how the elderly present with myocardial infarction, what evidence is available about therapies in the elderly, and when these therapies ought to be applied.

Who Are the Elderly?

Any attempt to define an elderly population is fraught with difficulty. What is that evanescent boundary that separates middle age from old age? It is far easier to refer abstractly to a group of "older" Americans than it is to define the group more precisely with firm dividing lines.

In a culture that rejects old age and embraces youth, the

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task of defining the elderly is particularly delicate and should be undertaken with care. Designating a group as "elderly" is widely regarded as a value judgment rather than an attempt to define a group of interest. In our culture everyone wants to live a long time, but no one wants to grow old.

Aging is a continuous process, and establishing a border across which a person passes from "middle age" to "old age" is artificial. Physiologic aging occurs at a varying rate within the population, and, thus, groups of adults defined by their chronologic age show great heterogeneity. Chronologic age provides an imperfect marker for physiologic age.

The younger the boundary for the elderly, the greater the heterogeneity of the defined group. In 1935, with the passage of the Social Security Act, age 65 was embedded in our national consciousness as the beginning of old age. Today, however, age 65 is considered relatively young. As a result of improvements in infant mortality and childhood death, about one in eight Americans today is 65 years or older, or roughly 30 million people. This compares with one in ten Americans aged 65 years or older at the turn of the century. The average life expectancy today for a person aged 65 is almost 17 years.[1]

Americans over 65, therefore, are not merely clustered between the ages of 65 and 75. Currently more than 40% of the population 65 years and older is aged 75 or more.[1] This group of senior citizens constitutes a rapidly growing portion of our population. For instance, the number of centenarians in the United States increased from 15,000 to 25,000 over the six years from 1980 to 1986.[1] As the "baby-boom" generation—those born between 1946 and 1964—reaches maturity, this number will increase even more dramatically. Given current projections, the number of people aged 85 and older will increase more than 700% between the years 1980 and 2050,[1] at a time when the rest of the population is expected to increase by only a third. Many people, therefore, now make the distinction between the young-old (65 to 74) and the old-old (75 +). The focus of this discussion is on the older group.

The elderly are voracious consumers of health care. The 65 years and older group, representing 12% of the population, accounts for a third of the country's total personal

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ABBREVIATIONS USED IN TEXT

AIMS = APSAC Intervention Mortality Study
APSAC = anisoylated plasminogen streptokinase activator
    complex
ASSET = Anglo-Scandinavian Study of Early Thrombolysis
GISSI = Gruppo Italiano per lo Studio della Streptochinasi
    nell'Infarto Miocardico
ISIS-2 = Second International Study of Infarct Survival
UCSF = University of California, San Francisco
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health care expenditures. In 1985 this group accounted for 30% of the country's hospital discharges and 41% of the hospital days of care.[1] Meanwhile, the group 75 years and older, representing 5% of the population, was responsible for 16% of all hospital discharges and 22% of all hospital days.[1] The group 85 years and older, representing just 1% of the population, accounted for 4.4% of the hospital discharges and 6.5% of the hospital days.[1]

Physicians see these patients commonly. Aside from the frequent hospital admissions, the average person aged 75 years and older visits a physician more than ten times a year. Almost 90% of this group have seen a physician within the past year.[1] This ready access to physician and hospital services by the elderly is a tribute to our federal insurance system.

The elderly are a common sight at this medical center. In the period from January through April 1989, for instance, the UCSF Emergency Department saw 420 octogenarians, about 7% of the total emergency department visits. Meanwhile, almost 20% of the patients admitted to the coronary care unit are 75 years or older.

Why Heart Disease in the Elderly Deserves Attention

Heart disease is the most important cause of mortality, morbidity, and the consumption of resources in the elderly. In fact, the preponderance of all deaths from heart disease occurs in the 65 years and older group. Heart disease is very much a disease of the elderly.[2]

Despite recent declines, heart disease far exceeds stroke and cancer as a cause of death in the elderly and in the use of resources. In the group 75 to 84 years, heart disease is responsible for 43% of overall deaths (cancer causes 20% of the deaths in this age group). In the 85 years and older group, heart disease accounts for 48% of the deaths.[1]

The importance of heart disease in the elderly is not merely an artifact of the death certificate. It is the leading cause of physician visits, hospital days, and short-stay hospital days for the elderly. In 1985 this important health problem accounted for 10% of all physician visits and almost 20% of hospital days.[1] In our emergency department, of the 420 visits by octogenarians between January and April 1989, 20% were for heart disease. The great majority, 85%, of these patients were admitted to the hospital.

How the Elderly Present With Myocardial Infarction

Myocardial infarction can be a subtle diagnosis at any age. Information from the Framingham study suggests that at least a quarter of infarctions occur without being diagnosed by a physician. Although many of these are truly silent infarctions, at least half are characterized by atypical symptoms.[3]

Despite the common wisdom that myocardial infarction presents atypically in the elderly, the literature suggests that most elderly patients actually are seen for either chest pain or shortness of breath. A review of our own experience supports this finding. Among 43 octogenarians who suffered an acute myocardial infarction at UCSF in the 18 months between October 1986 and April 1988, 35 (more than 80%) presented with either chest pain or shortness of breath. Although some came to medical attention with other symptoms including nausea, confusion, dizziness, and syncope, they were few in number. In addition, we diagnosed myocardial infarctions in a few completely asymptomatic patients being evaluated for anemia.

In a recent study, atypical presentations in the elderly correlated best with poor performance on a modified mental state examination.[4] It may be that atypical presentations occur most often in persons unable to communicate their symptoms well.

Are many myocardial infarctions missed in the elderly? The Framingham data for patients 75 years or older are sparse. Although the older men appear to have more unrecognized infarctions, the difference from younger groups is insignificant.

In another study autopsies that revealed a recent myocardial infarction were reviewed.[5] The investigators discovered that the correct antemortem diagnosis was made in only 43% of the cases. Infarctions were missed more often in the older patients. In patients older than 60—mean age of 72.1 ± 8.3 years—the authors found that the correct diagnosis was made in only 38%. The number of atypical presentations was no greater in the older group, however, and did not account for the discrepancy, but the older group did have many other coexistent diseases.

Overall it appears that myocardial infarctions are more often undiagnosed in the elderly, but they, nonetheless, present typically. The high prevalence of heart disease in the elderly should alert all physicians to both typical and atypical symptoms in this age group. The presence of more than one disease can obscure the importance of symptoms, typical or atypical, related to heart disease.

What Therapies Are Effective in the Elderly?

In recent years medical science has made significant progress in the treatment of myocardial infarction. Most of the trials of the efficacy of various interventions, however, have focused on middle-aged patients. These trials have provided little information on the effect of therapy on patients 75 years and older.

Decisions about the treatment of myocardial infarction in the elderly are limited by inadequate information. The extrapolation of results from middle-aged patients may not apply to the elderly, a group with a shorter life span, more coexistent diseases, and perhaps a different physiology. Furthermore, survival benefits in patients with relatively short life expectancies may be less important than quality-of-life considerations.

Although there is a dearth of information about myocardial infarction in the elderly, physicians every day are faced with treatment decisions in patients aged 75 years and older. All patients admitted with a myocardial infarction, for whom treatment is appropriate, receive therapy directed at relieving pain, reducing myocardial oxygen uptake, and supporting the blood pressure, in addition to monitoring for arrhythmias. While these interventions remain the founda-

tion for treatment in all age groups, pharmacologic interventions in the elderly must be instituted with care. All the possible adverse effects of the medical armamentarium occur more frequently in the elderly. The use of medicines in the elderly poses an important challenge because of age-related changes in drug absorption, distribution, metabolism, and excretion. In addition, the elderly are more likely to be taking many drugs, leading to the problems of drug interactions, noncompliance, or confusion about the correct dose.

What about other interventions? Physicians can only proceed from a good knowledge of the information about the elderly that is currently available. In particular, do aspirin, thrombolytic therapy, percutaneous transluminal coronary angioplasty, coronary artery bypass surgery, and secondary prevention have a role in the treatment of myocardial infarction in patients 75 years or older?

Should Elderly Patients With Myocardial Infarction Receive Aspirin?

Aspirin, truly one of the wonder drugs, has an established role in the treatment of many cardiovascular diseases. Recently the Second International Study of Infarct Survival (ISIS-2) collaborative group showed that a regimen of 160 mg a day of aspirin, started within 24 hours of the onset of symptoms and continued for a month, was as effective as thrombolytic therapy in reducing mortality from acute myocardial infarction.[6] When used with thrombolytic therapy, the effect of the two agents was additive and produced an even greater survival benefit.

The ISIS-2 trial enrolled over 17,000 patients from more than 400 hospitals across Europe. Fortunately, they did not have an upper age limit. The use of aspirin reduced mortality in every age group (Figure 1). More than 3,000 patients older than 70 years were enrolled in the arm of the study comparing the use of placebo and aspirin. The use of aspirin reduced vascular mortality at five weeks from 22.3% to 17.6%. Aspirin administration should be a part of the treatment of every person, at any age, who presents with myocardial infarction and does not have a strong contraindication to taking the medicine.

Should Elderly Patients With Myocardial Infarction Receive Thrombolytic Therapy?

Thrombolytic agents offer physicians an effective way to limit, and in some cases abort, acute myocardial infarction. Four large trials—the Italian Group for the Study of Streptokinase in Myocardial Infarction (Gruppo Italiano per lo Studio della Streptochinasi nell'Infarto Miocardico, GISSI),[7] the APSAC [anisoylated plasminogen streptokinase activator complex] Intervention Mortality Study (AIMS),[8] ISIS-2,[6] and the Anglo-Scandinavian Study of Early Thrombolysis (ASSET)[9]—have shown a reduction in mortality rates with the use of thrombolytic therapy in acute myocardial infarction (Figure 2). These trials have enrolled a varying number of elderly patients.

The GISSI study, published in 1986, did not have an age limitation. They randomly allocated almost 3,000 patients between the ages of 65 and 74 and more than 1,000 patients older than 75 years. In both groups streptokinase therapy reduced the mortality rate at 21 days, although neither result was statistically significant (Figure 3).

Published in 1988, the APSAC Intervention Mortality Study, a large, randomized, double-blind, placebo-con-

trolled trial of the effect on survival of a single dose of anisoylated plasminogen streptokinase activator complex given within six hours of the start of an acute myocardial infarction, was open to patients aged 70 years or younger. Only 176 patients who were between 65 and 70 years old were enrolled. The intervention significantly reduced mortality in the patients 65 years and older from 30.2% to 12.2%. The benefit appeared greater in the older patients than in the younger ones (Figure 4).

The ISIS-2 trial also provided important information about the effectiveness of thrombolytic therapy in the elderly. The trial, published in 1988, enrolled more than 3,000 pa-
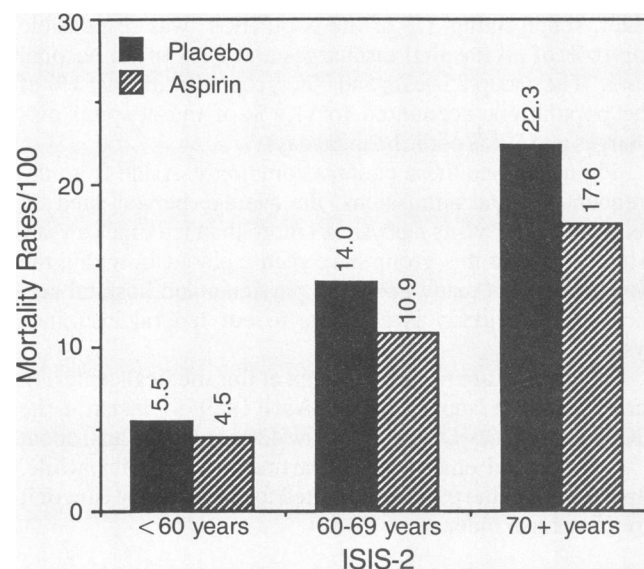

Figure 1.—The results shown in the graph reflect the mortality rates in the arm of the Second International Study of Infarct Survival (ISIS-2) that compared the use of aspirin with placebo. The results in each subgroup are statistically significant ($P < .05$) (adapted from the ISIS-2 study[6]).
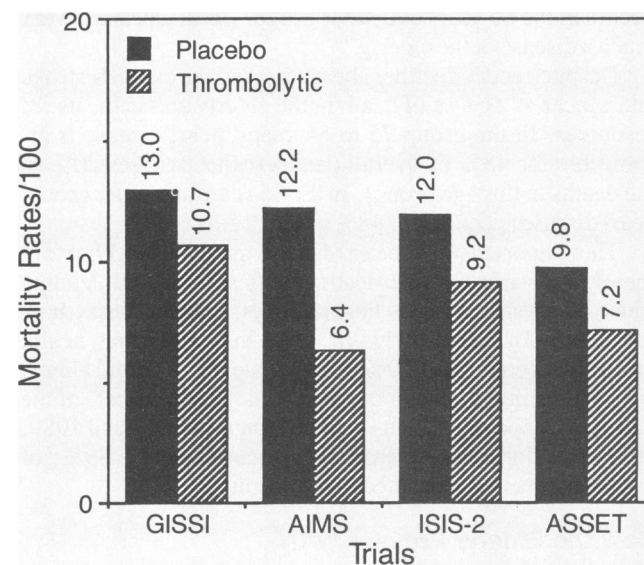

Figure 2.—The studies in the graph showed that thrombolytic therapy significantly reduced mortality from myocardial infarction (adapted from the Gruppo Italiano per lo Studio della Streptochinasi nell'Infarto Miocardico [GISSI],[7] the APSAC [anisoylated plasminogen streptokinase activator complex] Intervention Mortality Study [AIMS],[8] the Second International Study of Infarct Survival [ISIS-2],[6] and the Anglo-Scandinavian Study of Early Thrombolysis [ASSET][9] trials).

tients 70 years or older into the arm comparing the use of streptokinase and placebo. Administering streptokinase significantly reduced mortality from 21.6% to 18.2% (Figure 5). The effect of streptokinase was increased with the addition of aspirin, as the mortality rate was reduced from 23.8% to 15.8%.

The Anglo-Scandinavian Study of Early Thrombolysis, a double-blind, placebo-controlled trial of the effect of tissue plasminogen activator and heparin compared with heparin and placebo for the treatment of myocardial infarction, enrolled more than 1,500 people who were 66 to 75 years old. On a subgroup analysis, the older patients had the most impressive benefit from the treatment. The group 56 years and younger had a statistically insignificant reduction in mortality from 4.4% to 3.8%. Meanwhile, the group aged 66 to 75 years had a statistically significant reduction in mortality from 16.4% to 10.8% (Figure 6).

The studies, published in 1988, thus strongly suggest that thrombolytic agents have a role in treating the elderly. The two studies that had no age limit, GISSI and ISIS-2, both showed a benefit with thrombolytic therapy, although in the GISSI trial the difference was not statistically significant. The other trials provide firm support for thrombolytic therapy in persons as old as 70 years (AIMS) and 75 years (ASSET). Given these results, in the absence of a contraindication, age itself does not seem a legitimate reason to deprive a patient of the benefit of these agents.

Should Elderly Patients With Myocardial Infarction Have Percutaneous Transluminal Coronary Angioplasty?

The role of percutaneous transluminal coronary angioplasty in the treatment of myocardial infarction, in all age groups, is adjunctive.[10] This procedure, carried out in patients with acute myocardial infarction, provides no greater benefit than administering thrombolytic agents. Furthermore, recent studies show that it has no role immediately following thrombolytic therapy.[11] Only patients with a contraindication to thrombolytic therapy should be considered

for coronary angioplasty as the primary therapeutic intervention.

In addition, there is a paucity of data about the use of percutaneous transluminal coronary angioplasty in the elderly. The little data that are available suggest that it holds no special benefit for this group, as success rates for the elderly are lower than in younger groups.[12] No controlled trials have been done in the elderly to guide physicians' approach.

Should Elderly Patients With Myocardial Infarction Have a Coronary Artery Bypass Graft?

In patients with acute myocardial infarction, there is no role for surgical treatment as a primary intervention. Patients with an infarction that progresses in a stuttering fashion are often considered for an operation, but there are
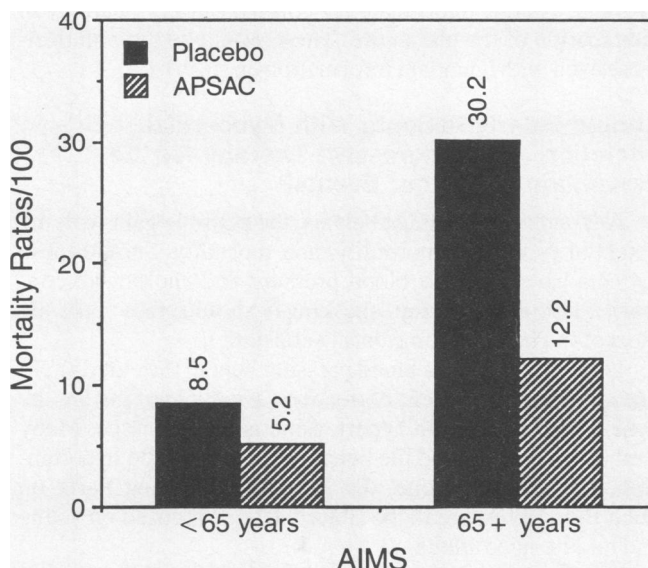

Figure 4.—The administration of anisoylated plasminogen streptokinase activator complex (APSAC) significantly reduced mortality in both age groups (adapted from the APSAC Intervention Mortality Study [AIMS][8]).
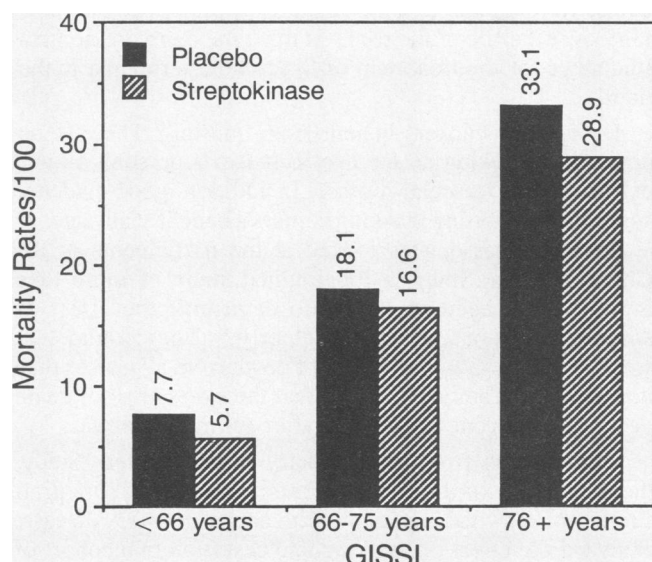

Figure 3.—Streptokinase therapy reduced mortality rates in all age groups, but the difference was significant only in the group aged 65 years and younger (adapted from the Gruppo Italiano per lo Studio della Streptochinasi nell'Infarto Miocardico [GISSI] trial[7]).
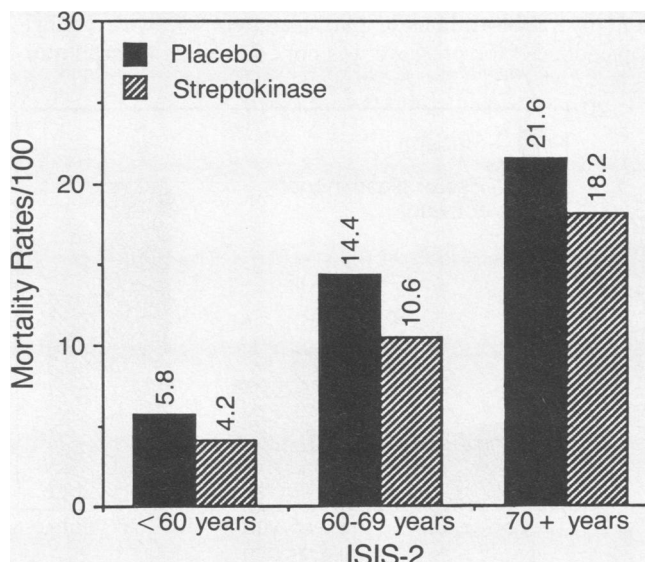

Figure 5.—Streptokinase therapy significantly reduced mortality rates in all age groups (adapted from the Second International Study of Infarct Survival [ISIS-2][6]).

no randomized trials, in any age group, to establish the benefit.

Patients who survive their myocardial infarction but who have residual coronary artery stenosis may also be considered for surgical intervention. Large clinical trials have identified groups of patients likely to have a survival benefit from an operation.[13] There are no such trials, however, for the elderly. Studies have shown that elderly patients have a higher surgical mortality than younger patients.[14-20]

Although an increasing number of patients 75 years and older are having coronary artery bypass grafts, the survival benefit to these patients is uncertain. Studies do not address whether patients who have this procedure survive longer than patients who do not. In addition, the benefit of the survival must be weighed in terms of the morbidity and mortality—including residual impairment—caused by the operation and by the tests done to evaluate the coronary artery anatomy in anticipation of the procedure. These would be difficult decisions even with abundant information on survival.

Should Elderly Patients With Myocardial Infarction Have Aggressive Therapy for the Prevention of Further Events?

Any intervention must balance the possible gain with the potential problems, morbidity, and mortality. Should these patients have vigorous blood pressure and cholesterol control? Should they stop smoking? Should they take β-blockers? There are some data to consider.

Does the control of blood pressure benefit the elderly? No one questions the benefit of treating severe hypertension; the benefit of treating mild hypertension is the real issue. Many studies have addressed the benefit of treating mild hypertension, but all except one, the European Working Party on High Blood Pressure in the Elderly trial,[21] focused on young and middle-aged adults.

The European Working Party on High Blood Pressure in the Elderly trial, a randomized, double-blind, placebo-controlled trial of 840 subjects who were aged 60 or older (mean age 72 ± 8 years), studied the effect of treating mild hypertension in the elderly. The trial used a diuretic combination (hydrochlorothiazide plus triamterene), with methyldopa added if the pressure was not controlled. Overall mor-

tality was decreased 26% by treatment ($P = .077$). The numbers of cardiac deaths and of strokes were significantly reduced. A subgroup analysis of patients older than 80 years, however, did not show a benefit of the treatment.

Patients who have suffered a myocardial infarction have reasons to reduce the work of the heart. Blood pressure control decreases afterload and reduces the myocardial oxygen requirement, so it appears a logical step in these patients. The survival benefit of the intervention in a large group of elderly, however, is not certain. In an asymptomatic elderly patient, the control of mild hypertension may be preferable but should not be considered imperative.

Does controlling cholesterol levels benefit the elderly? The country is currently mobilized to control cholesterol, with best-selling books proclaiming various methods of reducing cholesterol levels and manufacturers marketing oat bran in every conceivable form. All this interest has come as a result of the National Cholesterol Education Program, initiated by the National Heart, Lung, and Blood Institute in 1985. In January 1988, an expert panel appointed by the National Cholesterol Education Program promulgated guidelines for the detection, evaluation, and treatment of hypercholesterolemia.[22] The applicability of these guidelines to the elderly, however, is not clear.

The elderly have a higher prevalence of cardiac disease than younger groups. Any reduction in mortality will have a greater effect on lives saved than a similar reduction in a group with a lower prevalence of disease. On the other hand, studies suggest that a high cholesterol level is less strongly predictive of cardiac mortality in the older age groups. This diminution of effect was seen best in the data from the Framingham study[23] and the data from the Multiple Risk Factor Intervention Trial (although the upper age range for the latter trial was 57 years).[24]

There are no study findings in the elderly to support a survival advantage in subjects whose cholesterol level was lowered. Even the large trials of cholesterol-lowering agents, despite showing a 2% decrease in coronary artery disease incidence and mortality for each 1% reduction in cholesterol levels, were unable to show significant differences in mortality over the life of the trial. At this time there are no firm guidelines for the treatment of hypercholesterolemia in the elderly.

Do elderly smokers benefit from quitting? There is no doubt that smoking at any age increases a person's risk of dying of cardiovascular disease. In addition, good evidence suggests that quitting smoking confers a benefit at any age.

Jajich and associates looked at the participants of the Chicago Stroke Study, a longitudinal study of more than 2,500 people aged 65 to 74, to determine the effect of smoking on mortality in the elderly.[25] They found that smokers had a 52% higher rate of death from all causes than nonsmokers. They determined that the excess risk of death declined within one to five years after quitting cigarettes.

Investigators from the Coronary Artery Surgery Study, the large study of the effect of coronary artery bypass graft surgery on survival in patients with coronary artery disease, analyzed the effect of smoking and cessation in a cohort of almost 1,900 men and women, 55 years and older, who had angiographically proven coronary artery disease.[26] The six-year mortality rate was significantly greater in the group that continued to smoke than in the group that quit. The benefits
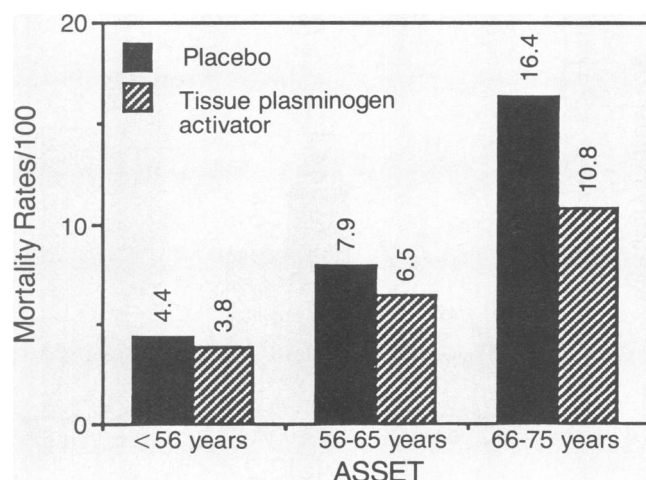

Figure 6.—The use of tissue plasminogen activator reduced mortality rates in all age groups, but the difference reached significance only in the two older groups (adapted from the Anglo-Scandinavian Study of Early Thrombolysis [ASSET][9]).

were significant both in the 55- to 64-years group and in the group aged 65 and older.

Should β-blockers be prescribed for elderly patients with a myocardial infarction? The use of β-blockers reduces the total mortality rate and rates of reinfarction and sudden death after myocardial infarction. Authorities currently recommend that patients without a contraindication to β-blockade should begin therapy with a β-blocker within one to four weeks after a myocardial infarction.

Do these recommendations apply to the elderly? One of the early studies, the alprenolol hydrochloride trial by Andersen and colleagues,[27] suggested that patients older than 65 years receiving β-blocker therapy had a higher mortality than the group receiving a placebo. Other trials, however, have not confirmed this finding. The metoprolol trial in patients older than 64 years showed a reduction in mortality from 14.8% to 8.1% ($P < .05$).[28] The β-Blocker Heart Attack Trial of the administration of propranolol hydrochloride in patients aged 60 to 69 years showed a significant reduction in

Figure 7.—Administering propranolol hydrochloride significantly reduced mortality after myocardial infarction in both age groups (adapted from the β-Blocker Heart Attack Trial [BHAT][29]).

Figure 8.—Timolol maleate therapy significantly reduced mortality in both age groups (adapted from the Norwegian study[30]).

mortality from 14.7% to 9.8% (Figure 7).[29] A Norwegian study of the use of timolol maleate in patients aged 65 to 75 years showed a significant reduction in mortality from 15.3% to 8.0% (Figure 8).[30] Elderly patients without a contraindication to β-blockers should receive β-blocker therapy after myocardial infarction.

When Should Physicians Intervene?

The data on the efficacy of interventions for the treatment of myocardial infarction in the elderly are incomplete. The decisions would not be easy even with a comprehensive data base. Although the knowledge of the efficacy of an intervention is an important component of the decision, the efficacy alone does not determine the decision. Decisions about therapy in the elderly supersede P values, as P values do not indicate the best way to care for an individual patient. Aside from the efficacy of the treatment, patients' preference, a patient's quality of life, and society's policies all play an important role.

A competent patient's preference is a critically important part of any decision. The challenge of informed consent is never greater than in an elderly patient. The burden of the illness, the unfamiliarity with the hospital, and the fear of modern technology may conspire to prevent truly informed consent.

In addition to a patient's consent, physicians consider quality of life. Quality-of-life determinations, always precarious, are no easier in the elderly than in other groups. There is no easy way for a physician to decide whether treatment is prolonging the dying process or giving a patient a reasonable chance at meaningful recovery. Moreover, what physician can confidently decide the degree of dementia, if any, that disqualifies someone from aggressive, and perhaps heroic, intervention? In addition, the few studies of the effects of treatment in the elderly have focused primarily on mortality as an end point and not on how the treatment affects a patient's overall quality of life.

A final consideration is that public policy is playing an increasingly important role in the care of the elderly. Some treatments are currently rationed by age. For instance, no person aged 75 years or older qualifies for a heart transplant. The scarcity of suitable donor hearts has led to a policy that excludes patients on the basis of age even though many elderly patients would derive substantial benefit from the intervention.

Rationing by age may not end with transplantation. The debate about the use of high technology in the care of the elderly continues on other fronts. Daniel Callahan, Director of the Hastings Center (Briarcliff Manor, NY), recently wrote a provocative book, *Setting Limits,*[31] in which he proposes that health care should be rationed on the basis of age. He argues that an age-based standard for terminating life-extending treatments should be instituted. In his view, "medicine should be used not for the further extension of the life of the aged, but only for full achievement of a natural and fitting life span and thereafter for the relief of suffering" (p 53).

Furthermore, the government is demanding studies demonstrating the effectiveness of therapies in the elderly. As the movement to stop the technologic imperative gains momentum, physicians seem set for a confrontation. More expensive procedures and interventions are done just as plans are made to curtail their use. People seem to agree on general policy but cannot agree on individual cases.
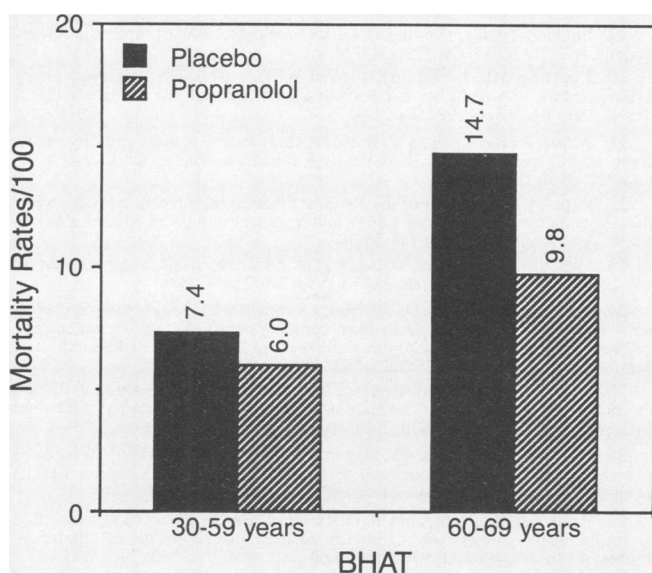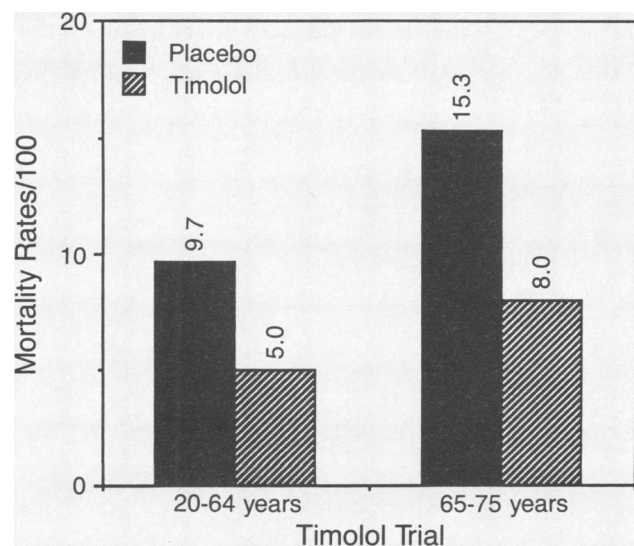
The policy debate will surely continue, and a full discussion of it falls outside the scope of this article. The range of opinions is wide, and the effect on the practice of medicine is sure to be profound. Currently, however, the technologic imperative remains strong, and the impetus will continue to favor intervention over palliation.

Conclusion

Myocardial infarction is an important health problem in a rapidly growing, heterogeneous segment of our population. Clinical challenges include the diagnosis of the condition, the evaluation of treatment options, and the decision when to intervene. There are remarkably few studies of the fast-growing population older than 80 years. The small number of studies of the elderly suggest that they most commonly present with myocardial infarction with chest pain or shortness of breath. The use of aspirin and thrombolytic agents appears to have significant benefit. The role of percutaneous transluminal coronary angioplasty or coronary artery bypass grafting in life extension is unclear. Cessation of cigarette smoking, the control of hypertension, and treatment with β-blockers almost certainly benefit the elderly in preventing future events. The role of aggressive treatment of hypercholesterolemia is undefined.

The greatest challenge in the care of the very old is deciding what treatments are appropriate. There are no easy answers to this question—especially in light of the paucity of clinical data about the efficacy of treatments in this age group. Physicians, knowledgeable about the limited literature, must make the best decisions they can, based on each patient's wishes and needs. The need for further studies of the elderly is obvious.

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